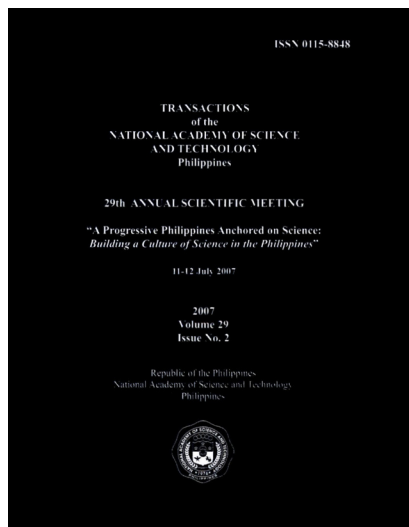


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Road Map for Biology Education: Issues and Strategies

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Biology is science of life and includes plants, animals and microorganisms. The current recognized domains of life based on an evolutionary framework as proposed by Carl Woese are: Archae, Procaryae and Eukarya. However, not too many biology teachers are imparting this classification to their students. Biology education, therefore, must keep abreast with the numerous breakthroughs and advances in the life sciences. It is imperative that the basic, intermediate and advanced concepts in biology be correctly and effectively taught to elementary, high school and college students.

A road map is therefore crucial as a starting point towards the improvement of biology education. The issues and strategies discussed in this paper were garnered from a round-table discussion on biology education held in April, 2008 at the Traders Hotel. In this forum, leading science educators at the elementary, secondary and tertiary levels were gathered to assess the current state of biology education in our country, identify the present gaps, issues, and concerns, find out which priorities need to be addressed, and hopefully come up with a preliminary course of action. It was a common consensus by the participants that biology education in the elementary, secondary, and tertiary levels should be supportive and complementary with each other.

The main factors identified to be affecting biology education at all levels are the curriculum, teacher factor, learner factor, and the learning environment. In the ensuing discussion, the issues in each of the factors were briefly presented, followed by recommended strategies.

Biology Curriculum

The main issue in the curriculum is that there are too many topics that need to be covered in one session, leading to information overload. Teachers are forced to keep on parroting information to their students

to be able to cope with their lesson plans, without determining whether or not their students understand the topics. Also, there are numerous misconceptions about some of the topics covered in the teaching materials (e.g., “Dark” reaction in photosynthesis).

The curriculum must, therefore, be reviewed and revised to make it more relevant and holistic. This should involve middle management, who will serve as implementors. The parents’ and students’ viewpoints must also be considered.

There should be a review of the scheduling of the subjects. Some topics that are not related should be deleted so that relevant discussions can be made. The whole biology teaching education program must be reviewed, and the curriculum for education majors standardized (e.g., B.S.E.E. / B.S.S.E major in General Science). The B.S. Mathematics and Science Teaching Program must also be considered.

Teacher Factor

Teachers are being asked to teach science subjects which are not their field of mastery. Some teachers lack inquiry-based training. Also, they are overloaded with teaching responsibilities and other duties as well. The teachers must undergo training and retooling in order to identify their innate intelligences and harness their talents and skills (e.g., peer mentoring). A teacher must also be a facilitator of learning who will consider the diverse leaning styles and multiple intelligences of the students.

Learner Factor

The learners cannot integrate what they have learned in school, causing fragmented learning. They also lack basic concepts in English and Math which are prerequisites for understanding biology. The students must not only be the learners, but the community as well, so that they will have ownership of the learning process. Participative learning must also be encouraged. There should also be English and Math drills to supplement their knowledge on the subject matter. Biological issues in the community should also be considered to generate interest among the students.

Learning Environment

The usual classroom set-up is a teacher-centered environment with minimal student participation. There is also a lack of audio-visual facilities that might aid in the learning process. Some of the classes are very large, limiting the learning outcome. Various kinds of environment must be used as contexts of learning, i.e., natural environment. The learning must be

community-based. Classes should be smaller whenever possible. In case of large classes, appropriate teaching strategies must be devised (e.g., audio-visual materials).

Tertiary Level

Biology as a degree program

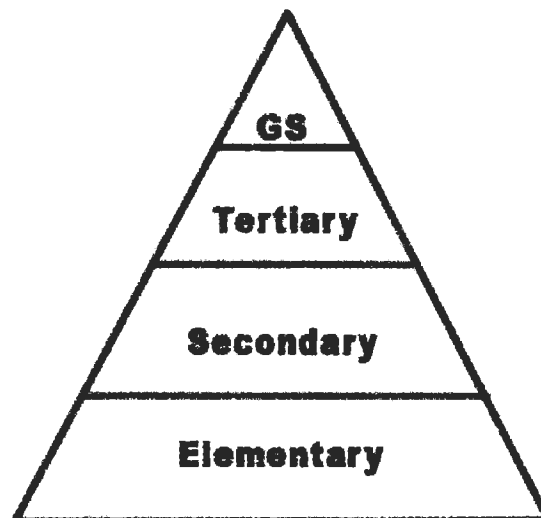
To alleviate the declining number of students taking Biology, the degree program itself must be restudied and reinvigorated. The introduction of novel courses such as bioinformatics and bioentrepreneurship will be of help. There should be some remedial or bridging classes, and discussions of ethical issues to enhance subject learning, even if there are some deficiencies in the tools in understanding specialized courses. There should be supplementary administrative support to be able to acquire additional facilities adequate for the learning process.

Biology as a subject

Integrative Biology must be considered to have a holistic approach in teaching the subject matter. The inquiry-based approach (investigative/exploratory) must be used to sustain students' interest in the subject.

The Commission on Higher Education (CHED) made the following initiatives with the goal of improving biology education: (1) identifying CHED Centers of Excellence and Development, (2) standardizing the BS Biology Curriculum, (3) adopting common policies and standards for academic programs in biology, (4) creating a technical committee for biology that oversees implementation of policies and programs, and (5) having an adopt-a-school program among COEs to uplift the status of biology education in other institutions of higher education.

As a conclusion, a road map for biology education is portrayed in the figure below. The elementary level forms the base, and thus serves as



the conduit for a general overview of biology. As the student goes up the higher rungs of the pyramid, more and more details are learned; there is more focus on important topics and issues. But all these are towards the goal of understanding life's complexity as it affects the individual, the environment and society

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